3Com U.S. Robotics®

56K Winmodem

User's Guide & Reference

This manual covers installation and operating instructions for the following modems:

3Com U.S. Robotics® **56K* Winmodem**®

3Com U.S. Robotics® **56K* Voice Winmodem**®

*IMPORTANT! In accordance with the ITU standard for 56K transmissions (V.90), this modem is capable of 56 Kbps downloads. However, due to FCC rules which restrict power output of the service providers' modems, current download speeds are limited to 53 Kbps. Actual speeds may vary depending on line conditions and other factors. Uploads from users to server equipment travel at speeds up to 31.2 Kbps. An analog phone line compatible with the V.90 standard or 3Com 56K technology, and an Internet provider or corporate host site compatible with the V.90 standard or 3Com 56K technology are necessary for these high-speed downloads.
See **http://www.3com.com/56k** for details.

PRODUCT DISCLAIMER

- This manual covers features that may or may not be present on your modem. Please consult your computer manufacturer's documentation for a list of your modem's supported features.

- For service and repair issues, contact your computer system manufacturer.

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WELCOME TO 56K* INFORMATION ACCESS

The International Telecommunication Union (ITU) determines the technical protocols that communications devices must use to operate with each other. Modems that comply with ITU standards can "talk" to other standards-compliant modems and fax machines worldwide.
The ITU has decided on a worldwide standard for 56K modem technology. With a 3Com U.S. Robotics modem, you can get 56K Internet access from any service provider who offers the ITU V.90 standard or 3Com 56K technology. 3Com is working with providers everywhere to quickly upgrade their service to the ITU V.90 standard.

* IMPORTANT! In accordance with the ITU standard for 56K transmissions (V.90), this modem is capable of 56 Kbps downloads. However, due to FCC rules which restrict power output of the service providers' modems, current download speeds are limited to 53 Kbps. Actual speeds may vary depending on line conditions and other factors. Uploads from users to server equipment travel at speeds up to 31.2 Kbps. An analog phone line compatible with the V.90 standard or 3Com 56K technology, and an Internet provider or corporate host site compatible with the V.90 standard or 3Com 56K technology are necessary for these high-speed downloads. See **http://www.3com.com/56k** for details.

PRODUCT FEATURES

Modulation Schemes

ITU-T V.90
3Com 56K technology
ITU-T V.34+
ITU-T V.34
ITU-T V.32bis
ITU-T V.32
ITU-T V.23
ITU-T V.22bis
ITU-T V.22
Bell 212A
ITU-T V.21
Bell 103

Error Control and Data Compression Schemes

ITU-T V.42
ITU-T V.42bis
MNP 2-5

Fax Modulation Schemes

ITU-T V.17
ITU-T V.29
ITU-T V.27ter
ITU-T V.21

Fax Standards

EIA 578 Class 1 FAX
EIA 592 Class 2.0 FAX

Front Channel Link Rates

28000, 29333, 30666, 32000,
33333, 34666, 36000, 37333,
38666, 40000, 41333, 42666,
44000, 45333, 46666, 48000,
49333, 50666, 52000, 53333,
54666, 56000, 57333

Back Channel Link Rates

4800, 7200, 9600, 12000,
14400, 16800, 19200, 21600,
24000, 26400, 28800, 31200

V.34+ Link Rates

4800, 7200, 9600, 12000,
14400, 16800, 19200, 21600,
24000, 26400, 28800, 31200,
33600

V.32bis Link Rates

4800, 7200, 9600, 12000,
14400

Additional Link Rates

300, 1200/75 (V.23), 1200,
2400

Fax Link Rates

2400, 4800, 7200, 9600, 12000,
14400

VOICE PRODUCT FEATURES

If your new modem has voice capabilities, the following information will apply:

Speakerphone

With the addition of a microphone, a set of external, powered speakers, and the appropriate software, your new voice modem provides all the convenience of a full-duplex speakerphone. Unlike many half-duplex speakerphones, your modem allows you to converse normally without annoying echoes and distortion. Simply plug the speakers into the jack on the modem identified with the and the

microphone into the jack with the icon and you are ready to go.

For voice enabled modems that do not have audio connectors on the bracket, you will have to connect your modem to the sound card via the 4-pin connector which is found on the modem card.

Personal Voice Mail

Personal Voice Mail turns your modem into a full-featured messaging system. Enjoy the convenience of professional voice mail in your home or office for a fraction of the cost.

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VOICE PRODUCT FEATURES

With Personal Voice Mail and the
appropriate software, you can record
custom greetings, receive messages, and set
up multiple voice "mailboxes." You can
even access your voice messages remotely.

Your modem will automatically detect
incoming fax/data/voice calls and route
them appropriately.

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INSTALLING THE WINMODEM WITH WINDOWS® 95, WINDOWS 98, AND WINDOWS NT 4.0

Plug and Play (PNP) Installation

Simply plug your new modem into your computer, power up, and be ready to work. The operating system does all the work of recognizing and configuring the modem for you. The modem must be installed before any software is loaded.

Your 3Com U.S. Robotics® modem is a Plug and Play device. However, Plug and Play will not work if you do not have resources available or if devices on your system are not reporting resource usage correctly. Your modem requires one COM port and one IRQ setting, Verify that your system has the necessary resources before installing the modem.

Determining Available Resources

Windows 95 and Windows 98

Your modem requires one COM port and one IRQ setting. Here is how you can verify that your system has the necessary resources before installing the modem.

1. Click **Start**, point to **Settings**, and then click **Control Panel**.

2. Double-click the **System** icon.

3. When the "System Properties" screen appears, click the **Device Manager** tab.

4. Double-click **Computer** and the "Computer Properties" screen appears.

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5. Select the option **Interrupt Requests (IRQs)**.

6. You will see the IRQs your system is currently using. If IRQs 3, 4, 5, and 7 are being used, you need to free an IRQ before you begin installation. This process involves moving a device from the IRQ you want to use, to a different (and usually higher) IRQ setting. To learn more about moving the device that is using the IRQ you want to use for your modem, read the documentation for that device or contact the manufacturer of that device.

Windows NT 4.0

1. Click **Start**, point to **Programs**, point to **Administrative Tools (Common)**, and click **Windows NT Diagnostics**.

2. Click the **Resources** tab. Then click the **IRQ** button. The IRQs being used by your system are listed. If IRQs 3, 4, 5, and 7 are being used, you need to free an IRQ before you begin installation. This process involves moving a device from the IRQ you want to use, to a different (and usually higher) IRQ setting. To learn more about moving the device that is using the IRQ you want to use for your modem, read the documentation for that device or contact the manufacturer of that device.

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How to Insert the Modem into the Computer

Before you unplug anything, label the cords or make a sketch of how things are connected. This can be helpful when you want to plug things back in later.

To avoid being shocked, make sure your computer and all peripheral devices are turned off and unplugged.

Before installing your modem, write its serial number in the space provided on the first page of this manual. You will find the serial number underneath the bar code on the white label on the modem.

Serial Number_____

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1. Turn off your computer and unplug it from the electrical outlet.

2. Unplug any peripheral devices (printer, monitor, keyboard, mouse, etc.) from the computer.

3. Remove the cover of the computer.Refer to your computer manufacturer's manual, if you need instructions.

4. Your modem is designed as an ISA card or a PCI card. Hold the modem so that the gold connectors are pointing at the floor and the speaker and other components (speaker, processor, etc.)are facing you.

- If the silver bracket is on the right, you have an ISA card.
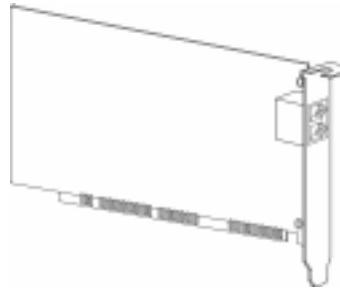
- If the silver bracket is on the left, you have a PCI card.
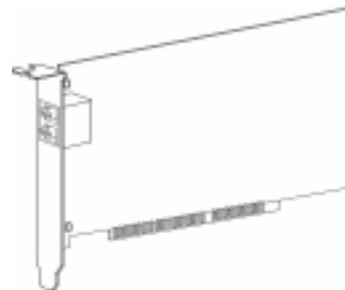
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5. Find an empty ISA or PCI expansion slot that is at least as long as the gold edge of your modem. (ISA slots are dark plastic grooves lined with metal and PCI slots are white and usually shorter than ISA slots.) Unscrew and remove the expansion slot cover. It is the long narrow piece of metal that keeps dust from entering through the opening perpendicular to the slot.

6. Holding the modem at each corner, align the gold edge with the empty expansion slot. Push down gently until the modem snaps into the slot. The drawing shows horizontally aligned expansion slots. Some computers have vertically aligned slots. The instructions apply to both styles.

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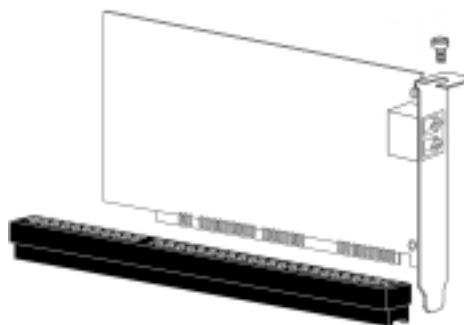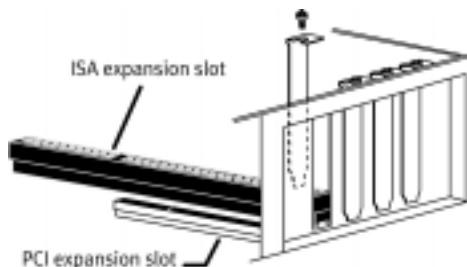
You need to apply a little pressure to seat the modem properly. Sometimes a gentle back and forth motion helps fit the modem all the way into the slot. If you feel resistance, the modem may not be properly lined up with the slot. Do not force it. Take the modem all the way out and try again.

7. Once the modem is inserted, fasten it firmly into place using the screw that you removed in step 4.

8. Replace the cover of the computer.

9. If you currently have a phone plugged into the wall jack you plan to use for the modem, disconnect the telephone cord from the jack.

The phone jack you use must be for an ANALOG phone line, the line most commonly found in homes. Most phones in office buildings are wired through digital lines. Be sure you know what type of line you have. The modem will be damaged if you use a digital phone line.

10. Plug one end of the phone cord included with the modem into the modem jack labeled

11. Plug the other end of the phone cord into the wall jack.

If you want to use a telephone on the same line as the modem when the modem is not in use, plug the telephone cord into the jack labeled

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to microphone *

to external speakers *

* voice faxmodems only
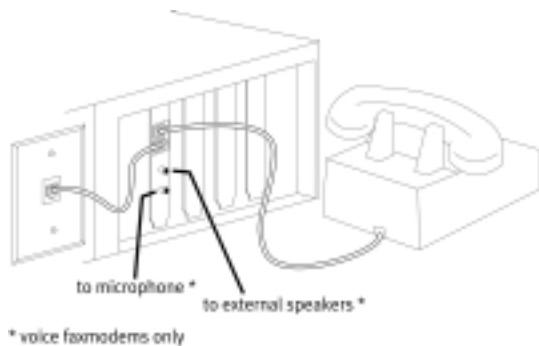
> **You cannot use the modem and a phone at the same time if they share the same telephone line.**

12. If your modem is a voice modem, it came with a microphone. Plug the microphone into the jack labeled ✎. You should also attach a set of powered speakers (not included) to the jack labeled ⟨⟨ ⟩⟩.

13. Plug the power cords, cables, and peripherals back into the computer and turn on the computer.

14. Start Windows.

15. Next you will need to install the Winmodem's drivers.

- Windows 95 - page 13
- Windows 98 - page 15
- Windows NT - page 18

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Installing Winmodem Drivers with Windows 95

1. When you see this screen,

- if you have a CD-ROM that contains your modem's drivers, insert the CD-ROM into your CD-ROM drive.
- if you have a disk that contains your modem's drivers, insert the disk into your disk drive.

Click **Next**.
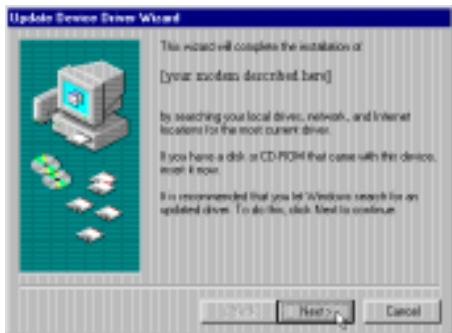
If this screen does not appear, refer to "If Plug and Play Does Not Detect Your Modem" on page 34.

2. Click **Finish**. Windows will copy the files to your hard drive.
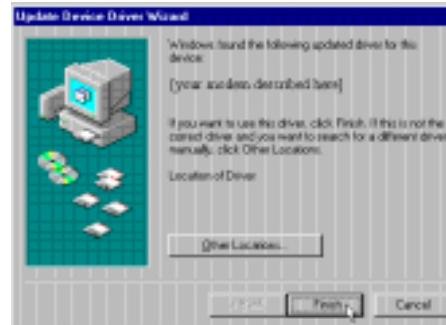
3. When Windows finishes copying your files, verify that the modem installation was a success.

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4. Click the Windows **Start** button and point to **Settings**. Then click **Control Panel**.

5. Double-click the **Modem** icon.

6. In the "Modems Properties" screen, you should see a description of your modem. This means the installation was a success. Click **OK**.

> **If you do not see your modem listed, the installation was unsuccessful. Refer to "If Plug and Play Does Not Detect Your Modem" on page 34.**

7. Next, click the **Diagnostics** tab at the top of the "Modems Properties" screen. Write down the COM setting for your modem in the following space. You may need to know this setting when you install your communications software.

COM Port_____

8. Click **More Info…**. The modem's status screens should appear in the box. Click **OK**.

> **If you do not see your modem's status screens when you click More Info, the installation was unsuccessful. Refer to "If Plug and Play Does Not Detect Your Modem" on page 34.**

You are ready to install communications software. Refer to the manual of the communications software for instructions on installation.

After you install your communications software, you are ready to use the Winmodem.

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Installing Winmodem Drivers with Windows 98

1. When you see this screen, Windows has detected the modem. Click **Next**.
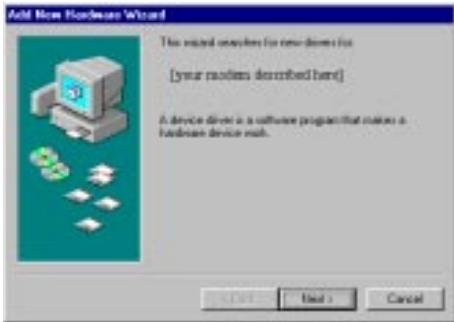
> **If this screen does not appear, go to "If Plug and Play Does Not Detect Your Modem" on page 34.**

2. Make sure the **Search for the best driver for your device** option is checked. Then click **Next**.

3. When you see the following screen:

- if you have a CD-ROM that contains your modem's drivers, check **CD-ROM drives** option and insert the CD-ROM into your CD-ROM drive.

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- if you have a disk that contains your modem's drivers, check the **Floppy disk drives** option and insert the disk into your disk drive.

4. The next screen tells you that Windows has found the driver for your modem. Click **Next**.

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5. Click Finish.

6. When Windows is finished copying files, you should verify that the modem installation was a success. Click the Windows **Start** button and point to **Settings**. Then click **Control Panel**.

7. Double-click the **Modems** icon.

8. In the "Modems Properties" screen, you should see a description of your modem. This means the installation was a success. Click **OK**.

> **If you do not see your modem listed, the installation was unsuccessful. Refer to "If Plug and Play Does Not Detect Your Modem" on page 34.**

9. Next, click the **Diagnostics** tab at the top of the "Modems Properties" screen. Write down the COM setting for your modem in the following space. You may need to know this setting when you install your communications software.

COM Port_____

You are ready to install communications software. Refer to the manual of the communications software for instructions on installation.

After you install your communications software, you are ready to use the Winmodem.

Installing Winmodem Drivers with Windows NT 4.0
without PNP Enabled

1. After installing the modem, turn on your Windows NT workstation.

2. Insert the installation disk into the disk drive.

3. Click **Start** and select **Run**.

4. Type **A:\Setup** and click **OK**.

5. When the Setup program starts, click **Install**.

6. The resource page contains the configuration information of your Winmodem in Windows NT. COM port, I/O address, and Interrupt Request Line are the three resources that may require adjustment.

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The Setup program should have detected available resources and entered them. If you want to use other settings, change them now.

7. When this is complete, click **OK**.

8. Remove the installation disk from the disk drive and click **Yes** to restart the computer.

You are ready to install communications software. Refer to the manual of the communications software for instructions on installation.

After you install your communications software, you are ready to use the Winmodem.

Installing Winmodem Drivers with Windows NT 4.0
with PNP Enabled

1. After installing the modem, turn on your Windows NT workstation.

2. After the Windows NT login, Windows NT will auto-detect your Winmodem hardware and the "New Hardware Found" screen appears.

3. Select **Driver from disk provided by hardware manufacturer** and click **OK**.

4. Insert the installation disk into the disk drive selected. **A:** should be the default.

5. Click **OK**. In the **Select Device** window your modem's model name should appear.

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6. Click on your modem and then click **OK**.

7. A screen will indicate that the files are being copied.

8. When the Winmodem window comes up, you know that the files are copied. Go to the **Resource** page.

9. The resource page contains the configuration information of your Winmodem in Windows NT. COM port, I/O address, and Interrupt Request Line are the three resources that may require adjustment. The Setup program should have detected available resources and entered them. If you want to use other settings, change them now.

10. When this is complete, click **OK**.

11. Windows NT will indicate that there has been a "System Settings" change and that you must restart your computer.

12. Remove the installation disk from the disk drive and click **Yes** to restart the computer.

> **If you need to uninstall the Winmodem, rerun the setup.exe program from the installation disk or click Winmodem in the Windows NT control panel.**

You are ready to install communications software. Refer to the manual of the communications software for instructions on installation.

After you install your communications software, you are ready to use the Winmodem.

UNINSTALLING THE WINMODEM WITH WINDOWS® 95, WINDOWS 98, AND WINDOWS NT 4.0

The process for removing your Winmodem from your computer is the same whether your operating system is Windows 95, Windows 98, or Windows NT.

1. Click Windows **Start**, point to **Settings** and click **Control Panel**.

2. Double-click the **Modems** icon.

3. Highlight the modem you wish to remove by clicking it.

4. Click **Remove**.

5. Shut down your system. Click **Start**. Click **Shut Down**. Click **Yes**.

6. When your computer is shut down, turn it off.

7. Unplug the computer's power cord from the computer.

8. Remove the computer's cover.

9. Remove the modem from its expansion slot.

10. Plug your computer's power cord back into the computer.

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TROUBLESHOOTING

Read This First!

1. Click Windows **Start**, point to **Settings**, and click **Control Panel**.

2. Double-click the **Modems** icon.

3. Click the **Diagnostics** tab.

4. Click on the **COM port** that your modem is assigned to, so that it is highlighted. If you do not see your modem on this screen, you need to shut down the computer and uninstall the modem. Reinstall your modem following the directions in the "Installing the Winmodem with Windows 95, Windows 98, and Windows NT 4.0" chapter.

5. Click **More Info**. You should see a list of the modem's ATI commands. Click **OK** and exit out of all open screens. If the ATI commands do not appear, your modem is not properly installed. Reinstall your modem following the directions in the "Installing the Winmodem with Windows 95, Windows 98, and Windows NT 4.0" chapter.

PROBLEM
The computer or software will not recognize the modem.

POSSIBLE SOLUTION

You may have a COM port/IRQ conflict.

1. Right-click the **My Computer** icon on your desktop.

2. Click **Properties**.

3. Click the **Device Manager** tab.

   - If you see a yellow exclamation point over your modem, you have a resource conflict, and it is probably an IRQ conflict. Continue with step 4.

   - If you did not see a yellow exclamation point, you may still have an IRQ conflict. Continue with the next "Possible Solution". If these possible solutions do not solve your problem, continue with step 4.

4. Click the modem's name to select it.

5. Click **Remove**.

6. You will be asked if you are sure you wish to remove the device. Click **OK**.

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7. When the "Confirm Device Removal" screen disappears, shut down Windows and turn off your computer.

8. Unplug the computer from its electrical outlet.

9. Remove the cover of the computer, physically remove the modem from its expansion slot, and replace the cover.

10. Plug the computer back into the electrical outlet, and turn it on.

11. When Windows restarts, once again right-click **My Computer** on your desktop and click **Properties**. Click the **Device Manager** tab. Double-click **Computer**. Make sure the **Interrupt request (IRQ)** radio button is checked. You can determine which IRQ settings are free on your system by looking for numbers that are not listed in the Setting column. One of the following IRQs needs to be free: 3, 4, 5, or 7.

12. After you have made these changes, reinstall your modem following the directions in the "Installing the Winmodem with Windows 95, Windows 98, and Windows NT" chapter. Once your modem is properly installed, make sure you have the correct COM port and IRQ settings in your software and/or in the Windows Device Manager.

POSSIBLE SOLUTION

Make sure the modem is turned on. An internal modem should turn on automatically when the computer is turned on.

POSSIBLE SOLUTION

You may not be entering modem commands in the proper manner. Type in all upper case (AT) or all lower case (at).

POSSIBLE SOLUTION

You may not be using fully Windows-based communications software. The Winmodem requires fully Windows based software. Some Windows-based communications and Internet software use a DOS-based dialer. Check with the software company.

PROBLEM
The modem will not go off hook to dial or does not answer the phone.

POSSIBLE SOLUTION

You may have plugged your modem's phone cord into a digital line. Plugging your modem's phone cord into a digital phone line can damage the modem. Call your phone company if you are unsure whether or not your phone line is digital.

POSSIBLE SOLUTION

You may have plugged your modem's phone cord into the wrong jack on the modem. Make sure the phone cord is plugged into a jack labeled with ⬚.

POSSIBLE SOLUTION

You might have a bad phone cord connection to your modem. The phone cord should be plugged into the jack labeled ⬚ on the modem and the wall phone jack. The phone cord should be no longer than 12 feet in length. Use the phone cord included with your modem if possible.

POSSIBLE SOLUTION

Your phone jack may have been wired incorrectly. Contact your telephone company. Ask them to make sure the tip and ring are on the inside pair of wires.

POSSIBLE SOLUTION

You may have devices between the modem and the phone jack. There should be no line splitters, fax machines, or other devices between the modem and the wall jack.

POSSIBLE SOLUTION

You may have a poor line connection. Place the call again. Calls are routed differently each time.

POSSIBLE SOLUTION

If you have voice mail, your dial tone may be altered because messages are waiting. Retrieve your voice mail messages to restore your normal dial tone.

POSSIBLE SOLUTION

Your software may not have auto answer enabled. Enable the auto answer feature. In your communication software's terminal mode, type **ATS0=1** and press **ENTER**. You need to enable auto answer before every session unless you alter your software's initialization string to permanently enable auto answer.

PROBLEM
Both modems sound like they are exchange carrier signals, but fail to establish a connection.

POSSIBLE SOLUTION

You may have a poor line connection. Place the call again. Calls are routed differently each time.

POSSIBLE SOLUTION

Your phone jack may have been wired incorrectly. Contact your telephone company. Ask them to make sure the tip and ring are on the inside pair of wires.

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PROBLEM
Your 56K modem cannot achieve a 56K Internet connection.

POSSIBLE SOLUTION

This modem is capable of 56 Kbps downloads. However, due to FCC rules which restrict power output of the service providers' modems, current download speeds are limited to 53 Kbps. Actual speeds may vary depending on line conditions and other factors. Uploads from users to server equipment travel at speeds up to 31.2 Kbps. An analog phone line compatible with the V.90 standard or 3Com 56K technology, and an Internet provider or corporate host site compatible with the V.90 standard or 3Com 56K technology are necessary for these high-speed downloads. Check **http://www.3com.com/56k** for a list of ISPs that observe the 56K ITU standard and/or offer 3Com 56K technology.

POSSIBLE SOLUTION

The phone lines in your area may not be 56K compatible. Call your phone company to find out if your phone line is compatible with the ITU standard for 56K and/or is compatible with 3Com 56K technology.

POSSIBLE SOLUTION

You may have devices between the modem and the phone jack. There should be no line splitters, fax machines, or other devices between the modem and the wall jack.

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PROBLEM
Errors are constantly occurring in your V.17 fax transmissions.

POSSIBLE SOLUTION

Your modem initialization string may be insufficient for fax transmissions. In terminal mode, type the following initialization string: **AT&H3&I2&R2S7=90S36=0** then press **ENTER**. The standard string for faxing is **AT&F1S36=0**.

POSSIBLE SOLUTION

There may be a Terminate and Stay Resident (TSR) program (such as a screen saver or virus scanner) running in the background, disrupting data communications. Disable any Terminate and Stay Resident (TSR) programs running in the background. If you have software running as a TSR, check the software's manual for information about disabling its ability to operate as a TSR.

POSSIBLE SOLUTION

Your baud rate may be set too high. In your communications software, lower the baud rate to 9600, 7200, or 4800.

POSSIBLE SOLUTION

You may be trying to fax a compressed file. Decompress the file using the application with which it was compressed. Then open it in the application with which it was created. Select your fax software as the printer and then print the file.

PROBLEM
Your communications software fails to initialize the modem.

POSSIBLE SOLUTION

Your software's port settings may be incorrect. Make sure the software's port settings match those for your modem.

POSSIBLE SOLUTION

Make sure the power of the modem is turned on. An internal modem should turn on automatically when the computer is turned on.

PROBLEM
If Plug and Play (PNP) does not detect your modem. You have installed the modem and Windows has restarted, but you see only your normal desktop. You do not see any screens indicating new hardware has been detected.

POSSIBLE SOLUTION

The Plug and Play installation was not successful. Try the following:

1. Click **Start** and click **Shut Down**.

2. When asked if you wish to shut down your computer, click **Yes**.

3. When Windows indicates that it is safe to turn off your computer, turn it off.

4. Wait 15 seconds before turning the computer back on.

5. Windows may detect your modem upon this restart, even if it did not detect the modem during the initial installation.

   - If you see screens indicating that new hardware has been detected by Windows, follow the on-screen instructions to install the modem.

   - If you do not see the new hardware screens, continue with step 6.

6. Click Windows **Start**

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7. Point to **Settings**

8. Click **Control Panel**.

9. Double-click the **System** icon.

10. Click the **Device Manager** tab on the "System Properties" screen.

11. Look for "Other Devices" or "Unknown Devices" in the list that appears.

- If you do not see either of these options in the list, contact your computer manufacturer for technical assistance.

- If you do see one of these options, double-click the option and continue with step 12.

12. If the description that appears matches the modem you are trying to install, click **Remove**. If it does not, contact your computer manufacturer for technical assistance.

13. Click **OK** when Windows asks if you wish to remove the device.

14. Restart the computer and continue with the on-screen instructions. If the computer does not detect the modem after this second restart, contact your computer manufacturer for technical assistance.

GLOSSARY

Cross references are printed in **boldface**. Cross references with items in the Data Commands found in the "Technical Reference" section, are printed in *italics*.

analog loopback

A modem self-test in which data from the keyboard or an internal test pattern is sent to the modem's transmitter, turned into analog form, looped back to the receiver, and converted back into digital form.

analog signals

A variety of signals and wavelengths that can be transmitted over communications lines such as the sound of a voice over the phone line. These signals are in contrast with **digital signals**.

answer mode

The mode used by your modem when answering an incoming call from an originating modem. The transmit/receive frequencies are the reverse of the originating modem, which is in **originate mode**.

application

A computer program designed to perform a specific function, such as a word processing or organizing data into a spreadsheet.

ARQ

Automatic Repeat reQuest is a general term for a function that automatically allows your modem to detect flawed data and retransmit it. See **MNP** and **V.42**.

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ASCII

American Standard Code for Information Interchange is a code used to represent letters, numbers, and special **characters,** such as $, !, and /.

asynchronous transmission

Data transmission in which the length of time between transmitted **characters** may vary. Since the time lapses between transmitted characters are not uniform, the receiving modem must be signaled as to when the data bits of a character begin and then they end. The addition of **start/stop bits** to each character serves this purpose.

auto-answer

In this setting the modem can pick up the phone line when it detects a certain number of rings. See S-register S0 in the "Technical Reference" section.

auto-dial

A process where your modem dials a call for you. The dialing process is initiated by sending an *ATDT* (dial tone) or *ATDP* (dial pulse) command followed by the telephone number to dial. Auto dial is used to dial voice numbers. See command *Dn*.

baud rate

A term used to measure the speed of an analog transmission from one point to another. Although not technically accurate, baud rate is commonly used to mean **bit rate**.

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binary digit

A 0 or 1, which reflects the use of the binary numbering system. It is used because the computer recognizes either of two states, OFF or ON. The shortened form of binary digit is bit.

bit rate

This refers to the number of **binary digits**, or bits, transmitted per second (**bps**). It is also referred to as transmission rate. Communications channels using telephone channel modems are established at set bit rates, commonly 2400, 4800, 9600, 14,400, 28,800 and higher.

bits per second (bps)

This is the bits (**binary digits**) per second rate. Thousands of bits per second are expressed as kilobits per second or kbps.

buffer

A memory area set aside to be used as temporary storage during input and output operations. An example is the modem's command buffer.

byte

A group of **binary digits** stored and operated upon as a unit. In user documentation, the term usually refers to 8-bit units or **characters**. One kilobyte (KB) is equal to 1,024 bytes or characters; 640 KB indicates 655,360 bytes or characters.

carrier

A tone signifying a connection the modem can alter to communicate data across telephone lines.

character

A representation, coded in **binary digits**, of a letter, number, or other symbol.**characters per second (CPS)**
A data transfer rate generally estimated from the **bit rate** and the **character** length. For example, at 2400 bps, 8-bit characters with **start/stop bits** (for a total of ten bits per character) will be transmitted at a rate of approximately 240 characters per second (cps). Some **protocols**, such as error-control protocols, employ advanced techniques such as longer transmission **frames** and **data compression** to increase cps.

class 1 and 2.0

International standards used between fax **application** programs and faxmodems for sending and receiving faxes.

cyclic redundancy checking (CRC)

An error-detection technique consisting of a test performed on each block, or **frame,** of data by both sending and receiving modems. The sending modem inserts the results of its tests in each data block in the form of a CRC code. The receiving modem compares its results with the received CRC code and responds with either a positive or negative acknowledgment.

data communications

A type of communications in which computers are able to exchange data over an electronic medium.

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data compression table

A table containing values assigned for each **character** during a call under **MNP**5 data compression. **Default** values in the table are continually altered and built during each call: The longer the table, the more efficient **throughput** gained.

data mode

The mode in which the faxmodem is capable of sending and receiving data files. A standard modem without fax capabilities is always in data mode.

DCE

Data Communications (or Circuit-Terminating) **Equipment** is equipment such as dial-up modems that establish and control the data link via the telephone network.

default

Any setting assumed, at startup or reset, by the computer's software and attached devices. The computer or software will use these settings until changed by the user or other software.

detect phase

In the **ITU-T** V.42 error-control **protocol**, the first stage in establishing if both modems attempting to connect have **V.42** capability.

dictionary

The term used for compression codes built by the **V.42**_bis_ data compression algorithm.

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digital loopback

A test that checks the modem's RS-232 interface and the cable that connects the **terminal** (computer) and the modem. The modem receives data (in the form of **digital signals**) from the computer or terminal, and immediately returns the data to the screen for verification.

digital signals

Signals that are discrete and uniform. In this manual, the term refers to the **binary digits** 0 and 1. These signals are in contrast with **analog signals**.

DTE

Data Terminal (or Terminating) **Equipment** is a computer that generates or is the final destination of data.

duplex

Duplex indicates a communications channel capable of carrying signals in both directions. See **half duplex**, **full duplex**.

Electronic Industries Association (EIA)

This association is a group which defines electronic standards in the U.S.

error control

A variety of techniques that check the reliability of **characters** (**parity**) or blocks of data. **V.42** and **MNP** error-control **protocols** use error detection (**CRC**) and retransmission of flawed **frames** (**ARQ**).

facsimile

A method for transmitting the image on a page from one point to another. This is commonly referred to as fax.

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fax mode

The mode in which the faxmodem is capable of sending and receiving files in a **facsimile** format. See definitions for **V.17, V.27ter, V.29**.

flow control

A mechanism that compensates for differences in the flow of data into and out of a modem or other device. See commands *&Hn, &In, &Rn*.

frame

A **data communications** term for a block of data with header and trailer information attached. The added information usually includes a frame number, block size data, error-check codes, and Start/End indicators.

full duplex

These signals will flow in both directions at the same time over one line. In microcomputer communications, may refer to the suppression of the online **local echo**.

half duplex

These signals will flow in both directions, but only one way at a time. In microcomputer communications, may refer to activation of the online **local echo**, which causes the modem to send a copy of the transmitted data to the screen of the sending computer.

Hz

Hertz is a frequency measurement unit used internationally to indicate cycles per second.

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ITU-T

An international organization that defines standards for telegraphic and telephone equipment. For example, the Bell 212A standard for 1200 bps communication in North America is observed internationally as ITU-T **V.22**. For 2400 bps communication, most U.S. manufacturers observe V.22bis.

LAPM

Link Access Procedure for Modems is an error-control **protocol** defined in **ITU-T** Recommendation V.42. Like the **MNP** protocols, LAPM uses **cyclic redundancy checking** (**CRC**) and retransmission of corrupted data (**ARQ**) to ensure data reliability.

local echo

A modem feature that enables the modem to display keyboard commands and transmitted data on the screen. See command *En*.

MNP

Microcom Networking Protocol is an error-control **protocol** developed by Microcom, Inc., and now in the public domain. There are several different MNP protocols, but the most commonly used one ensures error-free transmission through error detection (**CRC**) and retransmission of erred **frames**.

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modem

A device that transmits/receives computer data through a communications channel such as radio or telephone lines. It also changes signals received from the phone line back to **digital signals** before passing them to the receiving computer.

nonvolatile memory (NVRAM)

A user-programmable random access memory which retains data when power is turned off. On some modems, it includes four stored phone numbers and the modem settings.

off/on hook

Modem operations that are the equivalent of manually lifting a phone receiver (taking it off-hook) and replacing it (going on-hook).

online fall back/fall forward

A feature that allows a high-speed, error-control modem to monitor line quality and fall back to the next lower speed in a defined range if line quality diminishes. As line conditions improve, the modem switches up to the next higher speed.

originate mode

The mode used by your modem when initiating an outgoing call to a destination modem. The transmit/receive frequencies are the reverse of the called modem, which is in **answer mode**.

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parity

A simple error-detection method that checks the validity of a transmitted **character**. Character checking has been surpassed by more reliable and efficient forms of error checking, including **V.42** and **MNP 2-4 protocols**. Either the same type of **parity** must be used by two communicating computers, or both may omit parity.

protocol

A system of rules and procedures governing communications between two or more devices. Protocols vary, but communicating devices must follow the same protocol in order to exchange data. The format of the data, readiness to receive or send, error detection and error correction are some of e operations that may be defined in protocols.

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RAM

Random Access Memory is memory that is available for use when the modem is turned on, but that clears of all information when the power is turned off. The modem's RAM holds the current operational settings, a **flow control buffer**, and a command **buffer**.

remote digital loopback

A test that checks the phone link and a remote modem's transmitter and receiver.

remote echo

A copy of the data received by the remote system, returned to the sending system, and displayed on the screen. Remote echoing is a function of the remote system.

ROM

Read Only Memory is permanent memory, which is not user-programmable.

serial transmission

The consecutive flow of data in a single channel. Compare it to parallel transmissions where data flows simultaneously in multiple channels.

start/stop bits

These signaling bits are attached to a **character** before and after the character is transmitted during **asynchronous transmission**.

terminal

A device whose keyboard and display are used for sending and receiving data over a communications link. This device differs from a microcomputer or a mainframe in that it has little or no internal processing capabilities.

terminal mode

Software mode that allows direct communication with the modem. This mode is also known as command mode.

throughput

The amount of actual user data transmitted per second without the overhead of **protocol** information such as **start/stop bits** or **frame** headers and trailers. Compare it with **characters per second**.

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V.8

The **ITU-T** standard specification that covers the initial handshaking process.

V.17 fax

An **ITU-T** standard for making **facsimile** connections at 14,400 bps, 12,000 bps, 9600 bps, and 7200 bps.

V.21

An **ITU-T** standard for modems operating in asynchronous mode at speeds up to 300 bps, **full-duplex**, on public switched telephone networks.

V.22

An **ITU-T** standard for modem communications at 1200 bps, compatible with the Bell 212A standard observed in the U.S. and Canada.

V.22bis

An **ITU-T** standard for modem communications at 2400 bps. The standard includes an automatic link negotiation fallback to 1200 bps and compatibility with Bell 212A/V.22 modems.

V.23

An **ITU-T** standard for modem communication at 1200 bps with a 75 bps back channel. This standard is used in the U.K.

V.27ter

An **ITU-T** standard for **facsimile** operations that specifies modulation at 4800 bps, with fallback to 2400 bps.

V.29

An **ITU-T** standard for **facsimile** operations that specifies modulation at 9600 bps, with fallback to 7200 bps.

V.32

An **ITU-T** standard for modem communications at 9600 bps and 4800 bps. V.32 modems fall back to 4800 bps when line quality is impaired.

V.32bis

An **ITU-T** standard that extends the V.32 connection range: 4800, 7200, 9600, 12,000, and 14,400 bps. V.32*bis* modems fall back to the next lower speed when line quality is impaired, fall back further as necessary, and also fall forward (switch back up) when line conditions improve. See **online fall back/fall forward**.

V.34

An **ITU-T** standard that currently allows data rates as high as 28,800 bps.

V.34+

An enhancement to **V.34** that enables data transfer rates as high as 33,600 bps.

V.42

An **ITU-T** standard for modem communications that defines a two-stage process of detection and negotiation for **LAPM error control**.

V.42bis

An extension of **ITU-T** V.42 that defines a specific data compression scheme for use during V.42 connections.

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V.90

The ITU-T standard for 56 Kbps modem communications.

Xmodem

The first of a family of **error control** software **protocols** used to transfer files between modems. These protocols are in the public domain and are available from many bulletin board services.

XON/XOFF

Standard **ASCII** control **characters** used to tell an intelligent device to stop/resume transmitting data.

Ymodem

An error-checking **protocol** that can send several files of data at a time in 1024-**byte** (1K) blocks. This protocol can use either checksums or CRC for error checking.

Ymodem G

This is similar to the **Ymodem**, except it relies on the modem for error checking, which makes it faster.

Zmodem

This is similar to **Xmodem** and **Ymodem**, except it includes batch transfer, the ability to recover from a partially complete transfer, an autostart feature, and improved efficiency.

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REGULATORY INFORMATION

Manufacturer's Declaration of Conformity

The manufacturer of this modem declares that the product conforms to the FCC's specifications:
Part 15:
Operation is subject to the following two conditions:
(1) this device may not cause harmful electromagnetic interference, and
(2) this device must accept any interference received including interference that may cause undesired operations.
Part 68:
This equipment complies with FCC Rules Part 68. Located on the bottom of the modem is the FCC Registration Number and Ringer Equivalence Number (REN).

You must provide this information to the telephone company if requested. The REN is used to determine the number of devices you may legally connect to your telephone line. In most areas, the sum of the REN of all devices connected to one line must not exceed five (5.0). You should contact your telephone company to determine the maximum REN for your calling area.
This equipment uses the following USOC jacks: RJ-11C.
This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

An FCC compliant telephone cord and modular plug are provided with this equipment, which is designed to connect to the telephone network or premises wiring using a Part 68 compliant compatible jack. See installation instructions for details.

Caution to the User

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IC (Canada)

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled Digital Apparatus, ICES-003 of Industry Canada.

UL Listing/CUL Listing

This information technology equipment is UL-Listed and CUL-Listed for use with UL-Listed personal computers that have installation instructions detailing user installation of card cage accessories.

Connecting to the Telephone Company

It is not necessary to notify the telephone company before installing the modem. However, the telephone company may request the telephone number(s) to which the modem is connected and the FCC information printed on this section.
Be sure that the telephone line you are connecting the modem to is a standard analog line and not a digital (PBX), party, or coin telephone line.

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If the modem is malfunctioning, it may affect the telephone lines. In this case, disconnect the modem until the source of the difficulty is traced.

Fax Branding

The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device, including fax machines, to send any message unless such message clearly contains in a margin at the top or bottom of each transmitted page or on the first page of the transmission, the date and time it is sent, an identification of the business or other entity, or other individual sending the message, and the telephone number of the sending machine or of such business, other entity, or individual.

(The telephone number provided may not be a 900 number or any other umber for which charges exceed local or long-distance transmission charges.)

Radio and Television Interference

This equipment generates and uses radio frequency energy and if not installed and used properly, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. The modem has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

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If this device does cause interference to radio or television reception, which you can determine by monitoring reception when the modem is installed and when it is removed from the computer, try to correct the problem with one or more of the following measures:

- Reorient the receiving antenna (for televisions with antenna reception only) or cable input device.
- Relocate the computer with respect to the receiver.
- Relocate the computer and/or the receiver so that they are on separate branch circuits.

If necessary, consult your dealer or an experienced radio/television technician for additional suggestions.

You may find the following booklet, prepared by the Federal Communications Commission, helpful:

How to Identify and Resolve Radio-TV Interference Problems
> Stock No. 004-000-0345-4
> U.S. Government Printing Office
> Washington, DC 20402

In accordance with Part 15 of the FCC rules, the user is cautioned that any changes or modifications to the equipment described in this manual that are not expressly approved by the manufacturer could void the user's authority to operate the equipment.

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For Canadian Modem Users

NOTICE: The Industry Canada (IC) label identifies certified equipment. This certification means the equipment meets certain telecommunications network protective, operational, and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line, individual service may be extended by means of a certified connector assembly (telephone extension cord.) The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Currently, telecommunication companies do not allow users to connect their equipment to jacks except in precise situations that are spelled out in tariffing arrangements with those companies.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

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For your own protection, make sure that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Do NOT attempt to make such connections yourself. Instead contact the electric inspection authority or electrician, as appropriate.

"NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5."
The Ringer Equivalence Number is located on the modem's circuit board.

- For service and repair issues, contact your computer system manufacturer.

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